most of the fjords in an E. ½ S. direction, as compared with the south-west direction of the fjords on the west coast.

THE new number of the *Mitteilungen* also contains a map of the flora of Schleswig-Holstein, with accompanying text by Dr. Ernest Krause, and an account of a journey to the sources of the Tigris by Prof. Wimsch.

THE paper read at Monday's meeting of the Royal Geographical Society was by Mr. J. R. Werner, on his journeys up the Ngala and Aruwimi tributaries of the Congo. The Ngala enters the Congo a little south of 2° N. lat., coming from a generally north-east direction. A little above its junction with the Congo is a channel through which the waters of the latter flow into the Ngala. For a considerable distance the banks of the river are low, swampy, and forest-clad. Gradually hills appear, and latterly bluffs, between which the channel narrows considerably. In May of last year, Mr. Werner accompanied the steamer to the Aruwimi, which was taking the men to Major Barttelot's camp at Yambuya. He was surprised at the number of sand-banks on the lower river, and the difficulties of navigation. After passing the town of Mokulu, the whole character of the country seemed to change, the islands stood higher out of the water and were covered with forest, which was crowded with palms, the crowns of which looked very pretty above the trees. The high banks on either side were lined with villages, or rather the sites of former villages, for the Arabs had been raiding here, and the natives were now living under roughly put-up sheds of leaves and sticks; the conical huts described by Stanley had almost entirely disappeared, and during the time Mr. Werner was on this river he only saw six, four of which were inside Major Barttelot's camp at Yambuya, and the other two in the village of Irungu. On the high bluff on which Stanley had found the large town of Yambumba, there was not a single hut on the vast clearing where the town had been, while on the opposite bank of the river such of the natives as had not been killed or carried into slavery were living under sheds and awnings of sticks and palm-leaves. On this side of the river the bank was quite low, and offered a strange contrast to the precipitous bluff on which the town had formerly stood. Above Yambumba the Aruwimi runs between two ridges of low hills, which are covered with magnificent timber. There are no more villages on its banks until Yambuya is reached.

AFTER the reading of Mr. Werner's paper at the Geographical Society, there was a discussion on the letter from Mr. Stanley which was read at the previous meeting. In this discussion Sir F. De Winton, Sir Samuel Baker, Colonel Grant, Rev. Horace Waller, and others took part. Sir Samuel Baker's statement was of considerable geographical interest. Against Mr. Stanley's doubts, Sir Samuel maintained the accuracy of his original observations as to the southward extension of Lake Albert Nyanza. He pointed out that Mr. Stanley himself refers to the very marked decrease in the size of the lake in the last few years, a decrease quite analogous to that which has taken place in Lakes Tanganyika and Nyassa. This decrease has no doubt tended to diminish the southern extension of the lake, and bring to light the vast extent of Ambatch or Sud which Gessi and others refer to. Sir Samuel maintains, moreover, that it will most probably be found that the two lakes (Albert Nyanza and Muta Nzigé) are really one, and are known among the natives by one name. The region which lies between them on our maps has never been visited by any European explorer. Sir Samuel pointed out the vast importance to Egypt of a precise knowledge of the laws which govern the increase or decrease of water in the Albert Nyanza, which is really one of the great sources of supply for the regions on the lower river.

IN the May number of the *Scottish Geographical Magazine* will be found a very complete account of Samoa and its people by Dr. G. A. Turner, who has lived many years on the islands.

THE town Kara-kol, on Lake Issyk-kul, has received the official name of "Prjevalsk" in commemoration of the explorer of Central Asia.

A GEOGRAPHICAL expedition, under the two brothers Grum-Grzimailo, has lately started for the exploration of the Eastern Tian-Shan. On April 19 it had reached Tchardjui, on the Trans-Caspian Railway. Its aim is to connect the explorations of M. Potanin in North-Western Mongolia with those of Prjevalsky. One of the two brothers is already well known for his explorations of the Pamir.

THE Russian Geographical Society is sending out the following expeditions:—M. Vilkitzki, who has made pendulum-observations on Novaya Zemlya, will continue the same measurements in Central and South-Eastern Russia. M. Faussek is sent out to the shores of the White Sea in order to make zoogeographical explorations in the Kandalak Bay, as well as for observations upon the secular rising of the coasts of the White Sea. M. Andrusoff, whose interesting researches into the geological history of the Caspian Sea have attracted a good deal of attention, will continue the geological exploration of Daghestan and Kuban; and M. Kuznetsoff will continue in the Caucasus his work upon the geography of plants. M. Antonoff is sent out to the Transcaspian region for the study of the conditions of animal and vegetable life in the desert; and MM. A. P. Semenoff and Yaschenko will visit the same region for zoological and botanical researches. Of ethnographical expeditions that of M. Katanoff to North-Western Mongolia is worth noting. The investigation of the folk-lore of the White Russians (Byelorusses) will be continued by MM. Romanoff and Dobrovolsky.

THE expedition to Tibet, the departure of which was delayed by the death of Prjevalsky, is now at the town Prjevalsk (formerly Kara-kol), and it will start in a few days, *viâ* the Bedel Pass, to Kashgar. The original plan of reaching Lhassa has been abandoned, and the expedition will limit its explorations to Eastern Turkestan and North-Western Tibet. It is under the leadership of Colonel Pyevtsoff, who accompanied Prjevalsky in all his memorable journeys. It includes also two other travelling companions of Prjevalsky—MM. Roborovsky and Kozloff—and a geologist, M. Bogdanovitch, who is commissioned by the Russian Geographical Society.

THE ROYAL SOCIETY CONVERSAZIONE.

THE annual *conversazione*, held by the Royal Society on May 8, was in every way brilliantly successful. There was a numerous attendance, and the programme had been arranged with the greatest skill and care. We refer to some of the most novel and important objects exhibited. In addition to these, the results set forth in many recent papers to the Royal Society were illustrated by experiments.

Mr. C. V. Boys, F.R.S., exhibited:—(1) Portable Cavendish apparatus for demonstrating the attraction of gravitation. This apparatus differs only from the well-known apparatus of Cavendish in matters of detail. First, instead of the beam 6 feet long, carrying heavy weights, used by Cavendish, or half a metre long, used by Cornu, the beam consists of a piece of lead only 1 centimetre long, and this is inclosed in a round tube of metal, outside which the attracting weights are placed. This reduction of size has been rendered possible by the use of quartz threads, the production of which was shown two years ago. The advantages gained by the reduced dimensions are increased sensibility, and almost perfect elimination of temperature disturbances. The particular apparatus exhibited is designed to show the effect, and that it is the same from time to time, rather than to determine the constant of gravitation absolutely. By arranging the two attracting weights and the two ends of the attracted body at different levels, the deflection is nearly doubled.—(2) Experiment showing the insulation of quartz. A pair of gold leaves are supported by a short rod of quartz which has been melted and drawn out about three-quarters of an inch. The atmosphere is kept moist by a dish of water. Under these circumstances a glass insulating stem allows all the charge to escape in a second or two. With the quartz but little change is observed in four or five hours. The quartz may be dipped in water and put back in its place with the water upon it. It insulates apparently as well as before.—(3) Apparatus for testing the elasticity of fibres. One of these pieces of apparatus consists of a microscope cathetometer arranged vertically, and a gravity bob which is deflected by the vertical pull of the fibre on a side arm. The lower end of the fibre is made fast to a beam carried by the microscope. A scale, to which the upper end of the fibre is fixed, is viewed by the microscope, which thus shows the stretch of the thread; the pulling force is found by subtracting the stretch from the vertical movement of the microscope and multiplying by a constant previously found. The second piece of apparatus is used to measure the fatigue of fibres after torsion.

Results of experiments with working model of the tidal Seine, exhibited by Mr. L. F. Vernon Harcourt. These experiments were undertaken with the object of obtaining an indication of the effects which the various schemes proposed for the improvement of the estuary of the Seine, by the prolongation of the training walls below Berville, would have upon the estuary if carried out. After ascertaining, by experiments, that the former and present conditions of the Seine estuary could be reproduced in miniature in the model, the various schemes proposed were successively introduced in the model, with the results shown upon the diagrams exhibited. The method of working this model has since been applied to the model of another estuary, which may be seen in operation at 6 Queen Anne's Gate, Westminster.

Profs. A. W. Rücker, F.R.S., and T. E. Thorpe, F.R.S., exhibited maps to illustrate the direction and magnitude of the regional magnetic disturbing forces in the British Isles. The British Isles can be divided into a comparatively small number of districts, in each of which the horizontal disturbing forces tend towards centres or loci of attraction, which are also regions of large vertical force. The shaded portions of the maps are districts of high vertical force, and it will be seen that the arrows which represent the horizontal forces on the whole point towards them. In Scotland the forces indicated by the dotted arrows were deduced from data collected in 1857-58 by Mr. Welsh. The five principal lines towards which the magnetic disturbing forces in Great Britain converge are in the immediate neighbourhood of (1) the Caledonian Canal; (2) the basalt of the Western Isles; (3) the centre of the Scotch coal-field, in which basaltic crystalline rocks occur; (4) the line in South-East Yorkshire, in which the Jurassic and Liassic strata thin out, and passing thence to the Lakes; (5) the Palæozoic ridge between London and the South Wales coal-field. There are well-marked centres of attraction, (1) between Reading and Windsor, (2) near the Wash, which have been specially studied. The disturbance which culminates in the first extends from Kenilworth to the Channel, and from Salisbury to the North Sea. The well-known anomaly in the difference of the declinations at Greenwich and Kew is thus accounted for. The maps also afford indications of other subsidiary centres.

Captain H. Capel L. Holden, R.A., showed:—(1) Chronograph for measuring the velocity of projectiles and small periods of time. This chronograph, of which the latest form with Captain Holden's most recent improvements is exhibited, is of the gravity type, originally invented by M. Le Boulengé; since its first introduction it has been improved by Captain Bréger, of the French Marine Artillery. Broadly speaking, it consists of a heavy pillar, to which are affixed two electro-magnets (the circuits of which are arranged to be interrupted by the action of the body whose velocity it is required to measure) which can support two rods, the shorter one of which, in falling, strikes a trigger table and releases a knife, which marks the other as it falls. The time elapsing from the commencement of the fall of the short rod until the knife strikes the other rod is obtained mechanically by means of the instrument called the disjunctor, which breaks both of the separate circuits simultaneously: a commutator in connection with this disjunctor enables errors due to the circuits not being broken simultaneously to be detected and corrected for. When an interval of time occurs between the two circuits being broken, the mark made on the rod by the knife will be more or less above that made when the disjunctor is used, and the space between the two marks gives the means of ascertaining the time, since the rod falls under the influence of gravity. In ordinary use, the screens, where the interruption of the circuit takes place, are made of a continuous wire in circuit, each with its electro-magnet and battery, and these screens are broken by the passage of the projectile through them. The disjunctor reading is arranged so as to be adjustable by altering the height of the magnet, so that, the screens being a fixed distance apart, a scale can be engraved on the micrometer bar of velocities in feet per second, thus saving time and avoiding frequent calculation.—(2) Holden hydrometer. This is intended more especially for use in connection with secondary batteries, for observing the density of the acid during charge and discharge. It consists of two parts—the hydrometer-float and the scale. In use, the scale is clipped to the battery plates or to the side of the containing vessel, the point being pushed down until it just touches the liquid, and the reading is then taken from the top of the hydrometer stem on the ebonite scale. The range of density and the size of the divisions can be varied according to the requirements. The advantages claimed for this form over the ordinary type of hydrometer are: greater sensitiveness, more open scale, and increased legibility owing to the reading being above the level of the liquid and side of the cell, freedom from adherence to the plates or side of the vessel, and the ready correction for temperature by means of a sliding scale.

A model illustrating the formation of ocean currents, exhibited by Mr. A. W. Clayden. This is practically a map of the Atlantic in which the land surfaces are raised about half an inch above the portions occupied by the sea. The continents and larger islands are made of wood cut into the required shape, while the smaller islands are represented by pins or small pieces of sheet metal driven into the board which forms the basis of the whole. This raised map forms the bottom of a shallow tray which can be filled with water up to the level of the land surfaces, thereby obtaining a map (on Mercator's projection) in which the seas are represented by the surface of water. Underneath the tray a wind chest is fixed, and a number of tubes are brought up from it through the continents, and bent over so that the jets of air delivered from them may impinge upon the water. These jets are so arranged as to approximately reproduce on a small scale the actual circulation of the atmosphere as laid down on a chart of the prevalent winds for the year. Care is taken to have as few tubes as possible, and they are so placed as to hide the least possible amount of the sea. The strong and persistent trades are simulated by bringing the openings of the tubes near to the surface of the water, while the fitful and uncertain winds of northern latitudes are imitated by allowing the jet to be considerably dispersed before coming into contact with the water. A foot-blower is attached to supply the wind, and any movement of the water is rendered visible by scattering over it some Lycopodium powder. A few moments after the blast is turned on, the whole surface of the model sea is in motion. All the principal currents of the North Atlantic are shown, including the return current between the great equatorial currents, and the northward stream along the west coast of Greenland. If a narrow opening is made in the Isthmus of Panama all that happens is that some of the return stream round the Mosquito Bay and Gulf of Darien flows into the Pacific, leaving the North Atlantic practically unaffected. But if a large part of Central America is removed, almost the whole of the tropical water passes through the opening, and the currents from Baffin's Bay and the Arctic Ocean are drawn down to the Azores and the Canary Isles. There is an absence of evident connection between the slack water close to the New England coasts and the Labrador current, but the apparatus does not attempt to imitate differences of temperature or differences of rotational velocity, hence any effect due to either of those causes must necessarily be absent. All that is attempted is to demonstrate the connection between the prevalent winds and general oceanic circulation, by showing that nearly all the movements of the water are determined by the direction of the winds and the contours of the coasts.

Mr. James Pitkin exhibited:—(1) Pitkin and Niblett's fire-damp meter. By means of these instruments it is possible to detect and estimate the percentage of oxygen or hydrogen in mixtures of these gases. In its simplest form it consists of two ordinary cylindrical bulbed mercurial thermometers. These are mounted on a suitable base, and are then graduated off in the ordinary way to Fahrenheit or Centigrade scale. One tube registers the temperature of the mixed gases. The other, which is the gas indicator, has its bulb coated with one of those metals which when in a very finely divided state have the peculiar property of occluding and facilitating the chemical combination of certain gases. When placed in a gaseous mixture and during the combination of the gases due to the above property of the metal, a considerable amount of heat is developed. The heat generated thus produces a corresponding rise in the mercurial column. To read the instrument the difference between the two scale readings is taken, and then, by comparison with a table supplied with each instrument, the percentage of gas may be read off. In the case of fire-damp and air or coal-gas and air, the amount of heat developed appears to correspond approximately to the explosive activity of the mixed gases. A sliding scale may be fixed on the instrument, which can be graduated in terms of percentages of any particular gas.—(2) Pocket electric lamp. This lamp is constructed for astronomical and other scientific purposes where a steady and a safe light is occasionally required. Its total weight is 1 lb. 13 oz., and it gives a light of 1 candle power for a period of six hours. Its charging current is 1 ampere at a potential of 5 volts for four hours.

A series of ancient wreaths and plant remains from the cemetery of Hawara, Egypt, exhibited by Mr. Percy E. Newberry, by permission of the Director of the Royal Gardens, Kew. These wreaths and plant remains were discovered last year by Mr. Flinders Petrie, in coffins of the Ptolemaic period, and date from about the first century before Christ. They are fully described by Mr. Percy E. Newberry, in Mr. W. M. Flinders Petrie's "Hawara, Biahmu, and Arsinoë," and were presented to Kew some few months since.

Gramme ring, rotating under the influence of the magnetism of the earth, exhibited by Mr. J. Wilson Swan. It is a motor of the type of the ordinary dynamo-electric machine, but without field magnets other than the north and south magnetic poles of the earth. The current passing in the ring is about half an ampere.

Preparations of the new element gnomium, recently discovered by Gerhard Krüss and F. W. Schmidt, of Munich, exhibited by Dr. Hugo Müller, F.R.S. Gnomium oxide; gnomium chloride (in aqueous solution); nickel from which the gnomium, which up to the present always accompanied it, has been separated; nickel oxide free from gnomium. Gnomium is a metallic element which, according to the discovery of Krüss and Schmidt, is always associated with cobalt and nickel, and consequently neither of these metals have up to the present been known in the pure state.

Illustrations of the new and the old astronomy, exhibited by Mr. Isaac Roberts. Among these was the photograph of the nebula 51 M. Canum Venaticorum; the original negative being shown under the microscope.

Mr. H. J. Chaney showed a hollow cylinder and sphere, used in the re-determination of the weight of a cubic inch of distilled water, 1889. $t = 62^\circ$, $B = 30$ inches. One cubic inch = 252·286 grains.

Voltaic balance, exhibited by Dr. G. Gore, F.R.S. Used for measuring voltaic energy in chemical analysis; strength of aqueous solutions; effect of light and heat on aqueous solutions; detecting chemical changes in liquids and measuring their rates: detecting chemical compounds and their combining proportions; measuring losses of voltaic energy during chemical combination; measuring chemical energy. By means of it the influence of 1 part by weight of chlorine in 500,000 million parts by weight of water has been detected.

Films of metals and metallic oxides deposited by electric sparks, exhibited by Prof. W. N. Hartley, F.R.S.

Hair from the Yenisei Mammoth, obtained by F. Schmidt, of the Academy of Sciences, St. Petersburg, exhibited by Prof. G. H. Seeley, F.R.S.

Drawings illustrating the feeding of Scrobiculariæ, exhibited by Dr. H. C. Sorby, F.R.S. The feeding of Scrobiculariæ, as also of Tellinæ, is by actively taking in mud by the indraught syphon and afterwards discharging it by the same, unlike the quiet habit of most other Conchifera.

Mr. J. Young showed—(1) a cluster of nests of a species of Swift (Collocalia) taken in one of the Society Islands; (2) a specimen of *Pluvianellus sociabilis*, a plover obtained in South America, of which only two specimens (obtained fifty years ago) were previously known in Europe; (3) the tail of a Japanese barndoor cock, 11 feet long.

Mr. W. H. Preece, F.R.S., exhibited—(1) calcedonified tree-trunk, from Arizona, U.S.A.; (2) transverse, tangential, and radial microscopical sections of the wood, to illustrate the original vegetable structures and the mineralogical changes which have taken place during and subsequently to the silicification of the woody tissues.

Egyptian blue ("Vesterien") artificially prepared by Prof. F. Fouqué, of the Collège de France, Paris, exhibited by Prof. J. W. Judd, F.R.S. This substance is shown to have the formula $CaO, CuO, 4SiO$. It has been obtained, not only in a glassy form, but in crystals, which are remarkable for their intense pleochroism (dark blue to rose pink), as was shown in specimen under microscope. For comparison specimens of ancient objects (Scarabei and ornaments used in mosaic work) were exhibited by Mr. R. H. Soden Smith, to illustrate the method in which this blue enamel was employed by the Egyptians. Other specimens of antique ornaments glazed with the Egyptian blue, exhibited by Mr. John Evans, Treasurer of the Royal Society.

A revolving stage for the microscope, exhibited by Prof. R. J. Anderson.

Prof. H. Marshall Ward, F.R.S., exhibited various parasitic fungi, and specimens of diseased timber showing characteristic symptoms of injury caused by them. The chief of these are:—(1) piece of larch stem, affected with the "larch disease," and exhibiting the cups of *Peziza* (*Helotium*) *willkommii* on the cancerous cortex; (2) specimen of fructification of *Polyporus sulphureus*; (3) piece of larch timber attacked by *Polyporus sulphureus*, showing the characteristic symptoms of the injury; (4) piece of oak timber, exhibiting the characteristic symptoms of disease due to the ravages of *Stereum hirsutum*; (5) piece of oak attacked by *Thelephora perdix*, showing the very different mode of injury due to this fungus; (6) piece of spruce fir, attacked by the mycelium of *Trametes radiciperda*, and exhibiting the very characteristic dark spots which serve to diagnose the disease; (7) piece of pine injured by *Agaricus melleus*, and showing the very different symptoms which betray the presence of this fungus; (8) piece of deal with grey mycelium of *Merulius lacrymans*, causing the common "dry rot" of timber; and a similar piece of timber attacked by the white mycelium of *Polyporus vaporarius*, another and quite different fungus, which produces a form of "dry-rot"; (9) portion of pine stem infected with *Peridermium pini*, the Æcidium form of *Coleosporium senecionis*,—the other form of this parasite is found on various species of groundsel (it does much damage to the pines in some forests, producing so-called "cankers" as disastrous as those of the "larch disease"); (10) specimen of wheat infested by *Ustilago carbo* (*U. segetum*), showing the destruction of the ears by the fungus, the black spores of which completely occupy the interior of the grain; (11) specimen of grass attacked by *Epichloe typhina*, a destructive ascomycetous fungus which infests the flowering shoots of pasture grasses; (12) culture specimens of *Sclerotia* developed from species of *Botrytis*, which destroy certain garden plants. Microscopic preparations of these are also exhibited.

Models illustrating a cause of contortions of strata, exhibited by Dr. Charles Ricketts. To induce these flexures, dry and powdered clay of different colours is spread in consecutive layers in a trough, when by the access of water, the clay becomes plastic, sand is poured on some special part, its weight in the experiment being supplemented by extra pressure; this causes the heavier substance to subside into the plastic mass; at the same time the clay-beds are squeezed outwards, the layers underneath being formed into films still continuous with those at the sides, which are rendered considerably thicker than in their original state, and are curved into folds, representing on a small scale such as frequently occur in stratified rocks. The experiment so exactly coincides with natural phenomena that it is reasonable to expect it will afford a true explanation of a frequent cause of contortion, and also of cleavage of strata (see "On some Physical Changes in the Earth's Crust, Part 3," *Geological Magazine*, April 1889, p. 165).

Amorphophallus campanulatus, exhibited by the Director of the Royal Gardens, Kew.

New optical apparatus for lecture demonstration, invented and exhibited by Mr. Eric Stuart Bruce:—(1) Apparatus for projecting Crookes's radiometer in action on the screen, so as to render its effects visible to large audiences.—(2) "The electro-graphoscope." A striking method of showing the illusions produced by persistence of vision to large audiences. In this apparatus a narrow lathe of wood, about an inch wide, is made to revolve rapidly by means of an electric motor, the effect being an almost invisible haze, but when the revolving lathe is placed in the path of the rays of light proceeding from an oxyhydrogen lantern, in which there is a transparent picture or photograph, the image is apparently cast upon the air, in the case of a statue giving the effect of bold relief. In reality minute portions only of the image are cast upon the revolving plane, in such rapid succession that they are united into the perfect whole by the retentive action of the retina of the human eye.

Mr. Eadweard Muybridge exhibited projections by the electric lantern of automatic electro-photographs, exposed at regulated intervals of time, illustrating the consecutive phases of bipedal locomotion, as synchronously viewed from two or more points of sight.

SCIENTIFIC SERIALS.

American Journal of Science, May.—The electrical resistance of stressed glass, by Carl Barus. Following up Warburg's experiments, which have thrown so much new light on the thermal relations of the resistance of glass, the author here deals specially